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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/259,762 03/01/99 YIN Z 303.531US1

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MM91/0828

EXAMINER

DIAZ, J

ART UNIT

PAPER NUMBER

2815

DATE MAILED:

08/28/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/259,762

Applicant(s)

YIN ET AL.

Examiner

José R. Díaz

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 12-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
 2. ☐ received in Application No. (Series Code / Serial Number) ____.
 3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 20) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

➤ Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-11, drawn to method, classified in class 438, subclass 1+.
- II. Claims 12-20, drawn to device, classified in class 257, subclass 640.

The inventions are distinct, each from the other because of the following reasons:

➤ Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case that the product as claimed can be made by another and materially different process such performing a combined oxygen plasma-HMDS treatment to the nitride surface prior forming a photoresist masking film pattern.

➤ Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

➤ During a telephone conversation with Janal M Kalis (Reg. No. 37,650) on August 9, 2000 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-11. Affirmation of this election must be made by applicant in replying to this Office action. Claims 12-20 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

➤ Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 103

➤ The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

➤ This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

➤ Claims 1-2, 4-5, 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gulett et al. (US Patent No. 4,330,569) in view of Katayama et al. (US Patent No. 5,372,677).

Regarding claim 1, Gulett et al. teach a method for conditioning nitride surface comprising the steps of: providing a semiconductor substrate comprising a film comprising silicon nitride (column 3, lines 65); treating the film in a vacuum of about 1.2 mm Hg (torr) in an atmosphere comprising oxygen (column 3-4, lines 65-68 and 1-5); applying a resist to the treated substrate (column 5, lines 30-35); patterning the resist (column 5, lines 35-39).

Regarding claim 2, Gulett et al. teach an energy source generating about 250 watts (column 4, lines 30-35).

Regarding claim 4, Gulett et al. teach that the silicon nitride film is exposed to the oxygen plasma for a time of about 10-15 minute (column 4, lines 10-11).

Regarding claim 5, Gulett et al. teach that the energy source is RF energy (column 4, lines 5-7).

Regarding claim 9, Gulett et al. teach removing the resist (column 6, lines 4-5).

➤ However, Gulett et al. fails to teach an oxygen flow rate, and adding an inert gas.

Regarding claims 10-11, Katayama et al. teach that O₂ is supplied at a flow rate of 20 cc/min, He (inert gas) is supplied at a flow rate of 100 cc/min, a wafer is placed on a lower electrode installed in the apparatus, a pressure of 300 mtorr is applied, and a plasma is generated for 7 seconds (column 3, lines 39-45).

Regarding claims 7 and 8, the method for conditioning nitride surface disclosed by Gulett et al. has the same steps that Applicant intends to claim, hence it is inherent

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that the profile distortion (i.e. footing and cutting) during photolithographic fabrication is reduced by the method described in the prior art.

Regarding the difference in the range of pressure, flow rate, power and time between the application and the prior art, it would have been obvious to one of ordinary skill in the art, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

➤ Therefore, it would have been obvious to one having ordinary skill in the art at the same time the invention was made to have modified Gulett et al. to include an oxygen flow rate and adding an inert gas since such modification would result in a stronger adhesion between the resist pattern and the resist, as described in column 2, lines 29-33 of Katayama et al.

➤ Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gulett et al. (US Patent No. 4,330,569) in view of Katayama et al. (US Patent No. 5,372,677) and further in view of Spencer et al. (US Patent No. 4,673,456).

Gulett et al. in view of Katayama et al., as stated supra, essentially disclose the claimed invention but fail to teach: exposure the oxygen gas to a microwave energy, and electrodes that are about 400-600 mils apart.

Regarding claims 4 and 6, Spencer et al. teach two plasma source (i.e. microwave power and radio frequency power) (Abstract) and two electrodes that are separated by a constant distance (column 9, lines 12-15, 38-41, and 51-56).

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Regarding the difference in the range of distance between the application and the prior art, it would have been obvious to one of ordinary skill in the art, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

➤ Therefore, it would have been obvious to one having ordinary skill in the art at the same time the invention was made to have modified Gulett et al. in view of Katayama et al. to include two plasma source (i.e. microwave power and radio frequency power) and two electrodes that are separated by a constant distance since such modification would result in a large voltage drop to accelerate positive ions towards the wafer, as described in column 9, lines 20-24 of Spencer et al.

Conclusion

➤ The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hah et al. (US Patent No. 5,212,119) disclose a method for maintaining the resistance of a high resistive polysilicon layer for a semiconductor device.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R. Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 8:00 - 5:00 Monday through Fridays.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mahshid Saadat can be reached on (703) 308-4915. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD
August 21, 2000



Mahshid Saadat
Supervisory Patent Examiner
Technology Center 2800